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(54) Tap for data transmission system

(57) In order to provide a tap for use with large diameter plastics fibre optics, the tap comprises an interally-reflecting prism 9 or the like 9, preferably of synthetic sapphire, adapted to be pressed fitted so as to penetrate the material of the sheath 2 in a light-tight manner and enter the core 1, and means 8 for transmitting signals into and receiving signals from the core 1 via an inclined face 9a of the prism 9. The prism is shown mounted on a casing for a transducer 8, and the transducer 8 and prism 9 are mounted in a first housing part 3 which co-operates and snap fits with a second housing part 5 to surround the sheath 2 of the optic and maintain the prism 9 in position relative thereto. The invention further includes a plastics fibre optic data transmission highway having one or more taps as described above in operative position on the fibre optic.

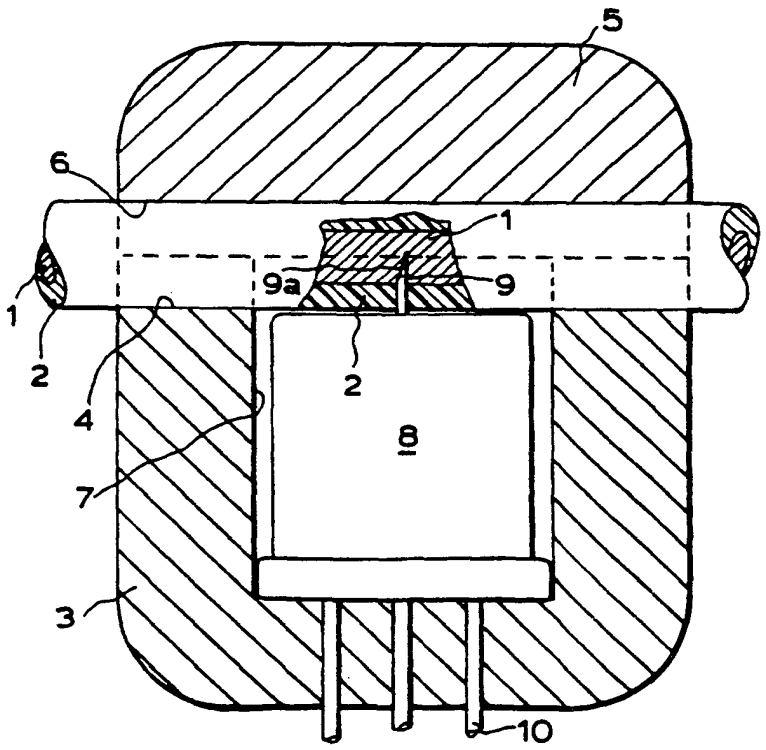

FIG.3.

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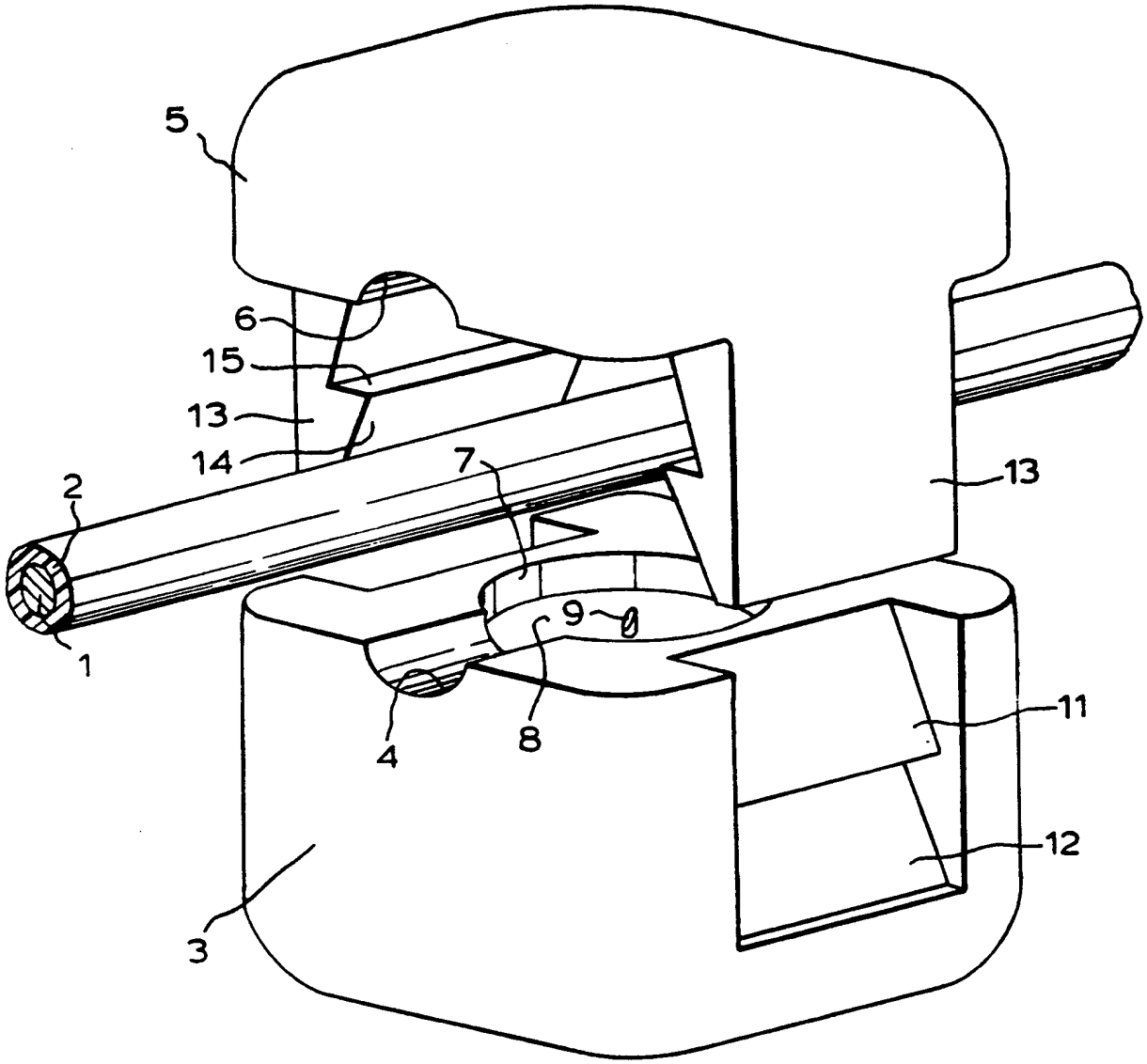

FIG.1.

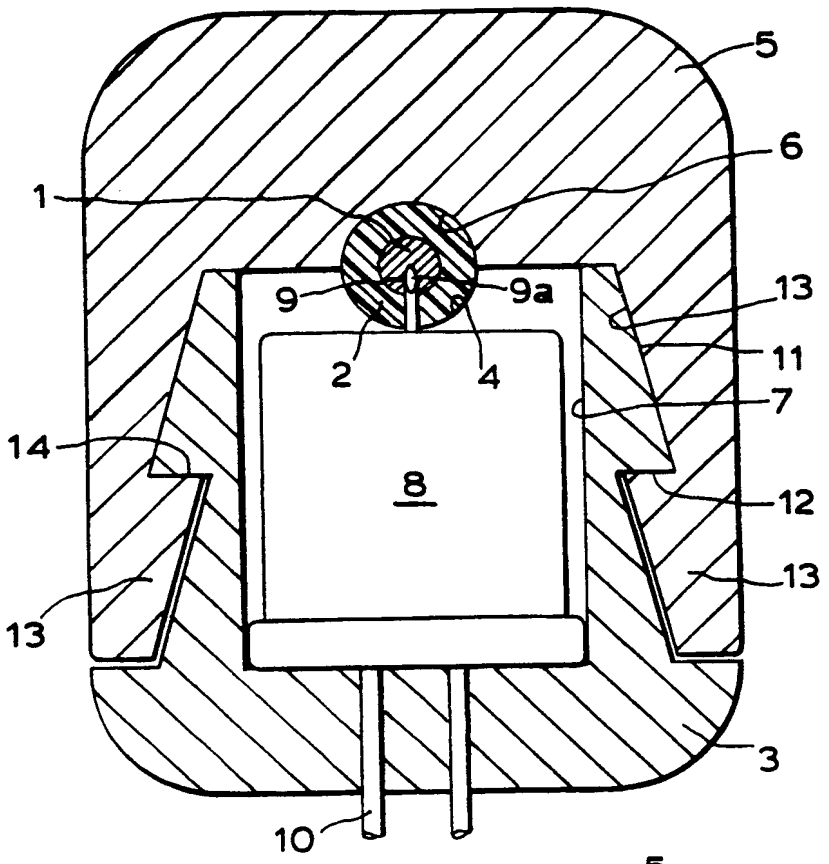

FIG. 2.

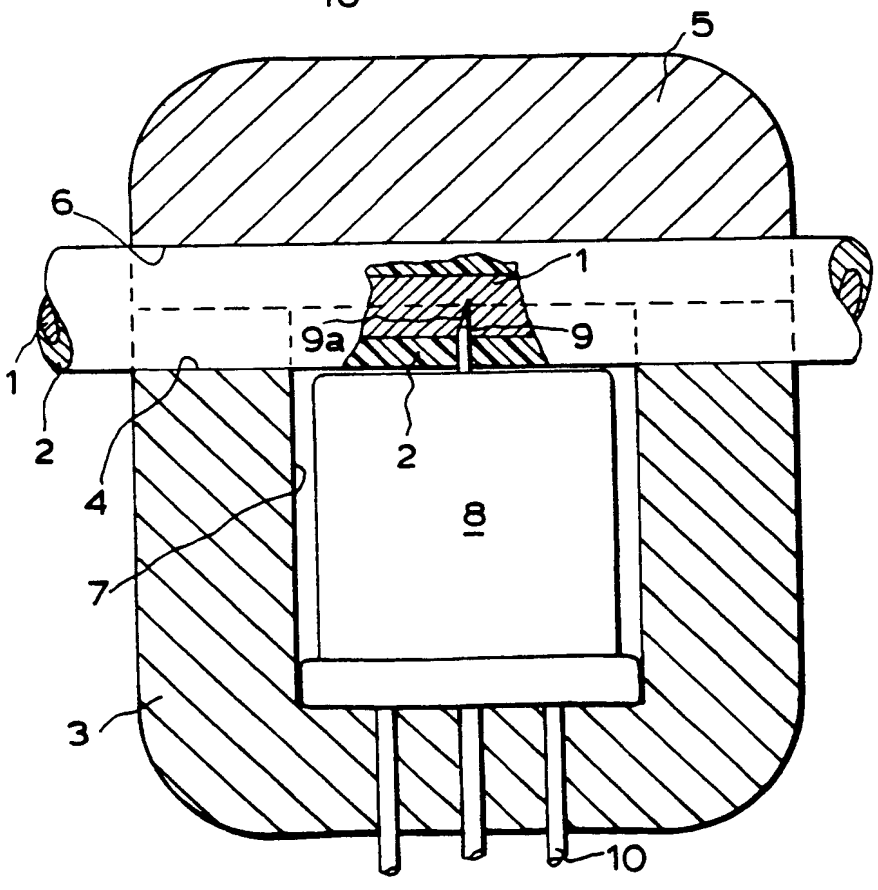

FIG. 3.

SPECIFICATION

Tap for data transmissi n syst m

This invention relates to taps for data transmission systems and to data transmission systems incorporating such taps.

While the tap and data transmission system of the invention are primarily intended for use in automotive vehicle applications, and will be described in connection with such applications, it will be understood that the invention is not necessarily so limited.

For some time past serious attention has been devoted to multiplex control systems for handling the data arising in automotive vehicles.

The use of copper data highways for electrical data signals, for which the technology is available, leads to electromagnetic noise and hence to unreliability of the system in an automotive environment, and also to potential interference with in-car entertainment systems.

Accordingly, attention is being directed to the use of fibre optic data highways. Normal telecommunications quality fibre optic data routes are difficult to terminate in an automotive application, and this leads to high expense. It is also difficult to bend these routes sharply as would be required to fit them into the limited space available in an automotive vehicle. The introduction of large diameter plastics optics, with comparatively high losses, offers a fibre optic system which may well be economic if the cost of making terminations (or connections) can be kept to a reasonable level. The comparatively high attenuation of the signals is of little consequence in the automotive field, given the short lengths of highway to be used.

The plastics optic essentially consists of a core of transparent plastics material (e.g. of 0.04 inches (1mm) diameter) within an opaque or light-tight sheath, giving an overall diameter of, for example, 0.08 inch (2mm). An advantage of these large diameter optics is that a degree of misalignment in connectors can be tolerated, thus reducing the need for expensive close tolerance connectors.

It is an object of the present invention to provide a tap for use with such plastics optics.

Because of the configuration of the optics, the light signals are continually refracted from the wall of the fibre, and this is the cause of the high losses. However, this property of th optics means that it is comparatively easy to read and write signals from and into the fibre, by obtaining access to the fibre through the sheath, without the need for deep penetration of the fibre.

In accordance with a first aspect of the invention, there is provide a tap for use with a plastics fibre optic comprising a core or fibre of transparent plastics material and a light-tight sheath of plastics material, the tap comprising a prism (as hereinafter defined), preferably of synthetic sapphire, adapted to be press fitted so as to displace the sheath material in a light-tight manner and contact the core, and means for transmitting signals into and receiving signals from the core via the prism.

As used herein, the term "prism" is intended to cover not only solid shapes meeting the geometric definition of a prism, but also other shapes which provide an internal reflection of light incident within a range of angles.

Accordingly, use may be made of a geometrical prism or of other forms, such as the currently preferred shape of a short cylindrical rod with an angled end presenting an elliptical face.

As an alternative to synthetic sapphire, use may be made of any other suitable hard transparent material, such as glass.

The prism is preferably mounted on a casing for a transducer means which includes the said transmitting and receiving means, and the transducer casing and prism are conveniently mounted in a first housing part which co-operates and snap fits with a second housing part to surround the sheath of the optic and maintain the prism in position relative thereto.

The invention further includes a plastics fibre optic data transmission highway having one or more taps in accordance with the invention as set forth above in operative position on the fibre optic.

The use of a press-fited prism, which may be applied by means of a dedicated press-fitting tool to snap fit the two parts of the housing together, should considerably improve the economics of fibre optic highways, and also provide a more efficient tap with less light losses than with an arrangement using the accepted technology.

The invention will be further described with reference to the accompanying drawings which show a preferred form of tap in accordance with the invention, and in which:

Figure 1 is a perspective exploded view of a form of tap in accordance with the invention;

Figure 2 is a transverse section through the tap of Fig. 1; and

Figure 3 is a longitudinal section through the tap of Fig. 1.

The drawings show a fibre optic highway including a transparent plastics fibre 1 of comparatively large diameter, such as 1mm, encased in a light-tight sheath 2 of opaque plastics material.

A first plastics material housing part 3 has a groove 4 to receiv and locate the sheath 2, while a second plastics material housing part 5 has a similar groove 6 to complete the embrace of the sheath 2. The housing part 3 has a cylindrical hollow 7 communicating with the groove 4 and receiving a housing for a transducer 8. Mounted on the housing of the trans-

ducer 8 is a prism 9 of synthetic sapphire.

The prism 9 illustrated can be seen to comprise a short length of cylindrical rod having its distal end cut obliquely to present an inclined elliptical face 9a.

The details of the transducer 8 are of no relevance to the present invention. It suffices to say that it has electrical leads 10 arranged in two rows to receive and transmit electrical signals, which it transduces to and from light signals transmitted and received respectively via the prism 9.

Side walls of the first housing part 3 are provided with ramps 11 terminating in shoulders 12, and these co-operate with resilient fingers 13 on the second housing part 5. The fingers 13 have ramps 14 and shoulders 15 so that as the housing parts 3 and 5 are brought together, the fingers 13 separate and then snap closed to lock the shoulders 15 behind the shoulders 12. As the housing parts are being brought together in this way, for example using a dedicated tool to compress the housing parts 3 and 5 together, the prism 9 pierces through the sheath 2 and enters the fibre 1, as illustrated in figures 2 and 3, to present the oblique face 9a in the longitudinal direction of the highway.

This face 9a enables the light signals travelling in either direction along the fibre 1 to be partially directed into the prism and retained therein by internal reflection for processing by the transducer 8. Similarly, light signals produced by the transducers may be transmitted along the fibre 1 in either or both directions using the prism 9 and face 9a.

Various modifications may be made within the scope of the invention. Thus, as an alternative to synthetic sapphire for the prism, use may be made of glass.

CLAIMS

1. A tap for use with a plastics fibre optic comprising a core or fibre of transparent plastics material and a light-tight sheath of plastics material, the tap comprising a prism (as hereinbefore defined) adapted to be press fitted so as to displace the sheath material in a light-tight manner and contact the core, and means for transmitting signals into and receiving signals from the core via the prism.

2. A tap as claimed in claim 1, in which the prism is of synthetic sapphire.

3. A tap as claimed in claim 1, in which the prism is of glass.

4. A tap as claimed in claim 1, 2 or 3, in which the prism is mounted on a casing for a transducer means which includes the said transmitting and receiving means.

5. A tap as claimed in claim 4, in which the transducer casing and prism are mounted in a first housing part which co-operates with a second housing part to surround the sheath of the optic and maintain the prism in position relative thereto.

6. A tap as claimed in claim 5, in which the two housing parts snap fit together.

7. A tap as claimed in any of the preceding claims, in which the prism is in the form of a short length of cylindrical rod with the end nearer the optic fibre inclined to planes orthogonal to the axis.

8. A tap for use with a plastics fibre optic substantially as hereinbefore described with reference to the accompanying drawings.

9. A plastics fibre optic data transmission highway having one or more taps as claimed in any of claims 1 to 8 in operative position on the fibre optic.

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